

Copeland™ ZF and ZFD Scroll Compressor Ranges for Low Temperature Refrigeration Using R407A/F, R448A/R449A and R404A

Emerson developed the ZF range to provide the best performance in low temperature. The range has a wide application envelope as it can operate from -40°C evaporating temperature to +7°C. They have been optimized in their design to perfectly fit frozen food application requirements. Thanks to their scroll compliance mechanism, these scroll compressors feature particularly high tolerance to liquid slugging.

The range consists of:

- ZF*K4E models that operate with liquid injection in order to control discharge temperature and increase the operating envelope.
- ZF*KVE models that are optimized for vapor injection with use of a sub-cooler. This boosts the refrigeration system cooling capacity and efficiency.
- ZF*K5E models that operate both with liquid injection or vapor injection.

These compressors are qualified for R407A/F, R448A/R449A, R404A and R134a for certain models.



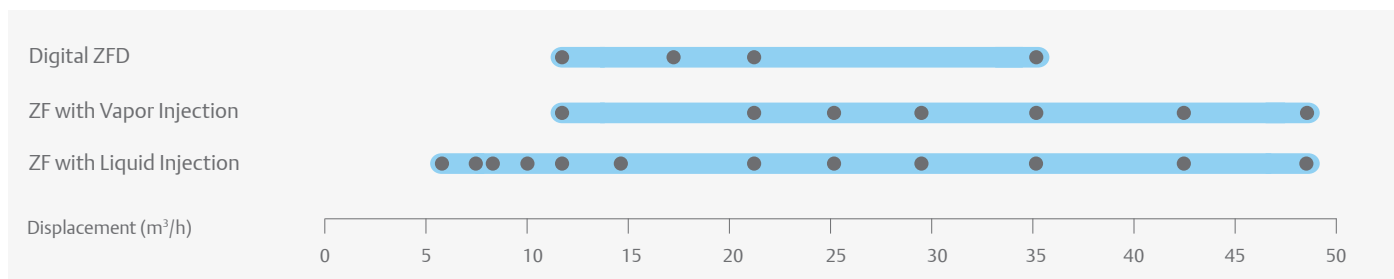
ZF compressor for low temperature refrigeration with and without sound shell

ZFD Digital Scroll Compressors

Based on the unique Copeland compliant scroll design, the digital modulation operates on a simple mechanism. Capacity control is achieved by separating the scroll sets axially over a small period of time. It is a simple mechanical solution allowing precise temperature control and system efficiency and it requires no other components.

Digital scroll technology provides continuous, stepless modulation from 10% to 100% with no operating envelope restriction. As a result, system pressures and temperatures are tightly controlled. These compressors provide optimum performance for refrigeration units, refrigeration packs, process and agricultural units.

ZF and ZFD Compressor Line-Up



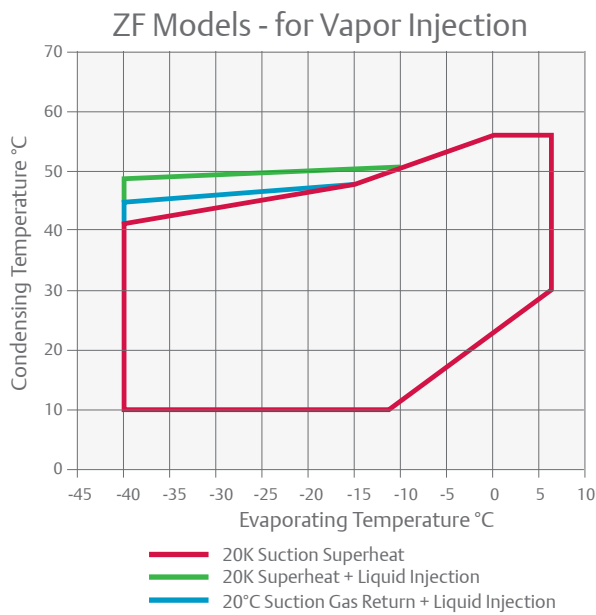
Features and Benefits

- Wide operating envelope with 10°C low condensing temperature to minimize energy consumption
- One model for multiple refrigerants
- Light weight and compactness, up to half the weight of equivalent semi-hermetic compressor
- Optional sound shell allowing up to 10 dBA sound attenuation
- ZF models with liquid injection
 - Easy, efficient and reliable injection via Discharge Temperature Control valve (DTC)
- ZF models with enhanced vapor injection
 - Seasonal efficiencies compared to Emerson's best semi-hermetic compressors
 - Improved system capacity and efficiency by 40% and 25% respectively, making them the most efficient compressors on the market.
 - Possibility to reduce the equipment and component sizes by using smaller compressors

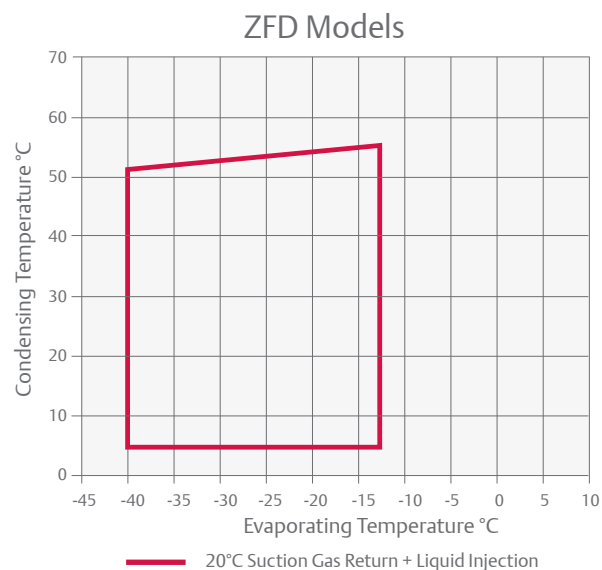
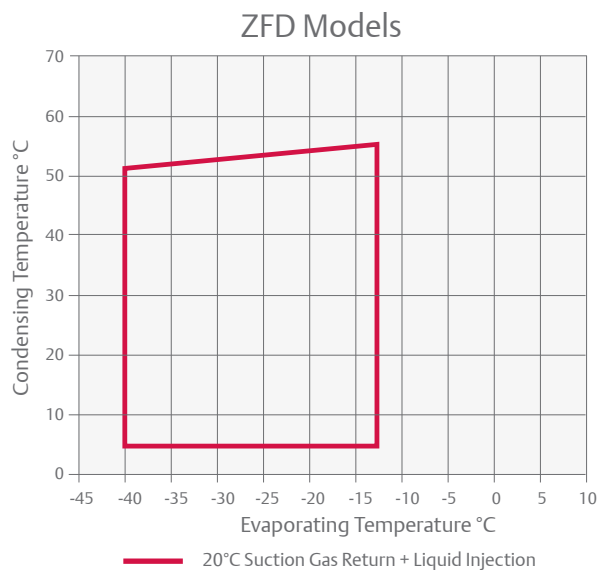
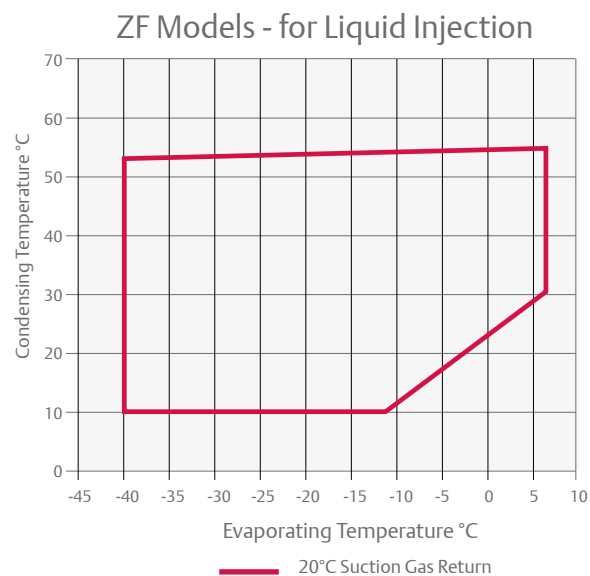
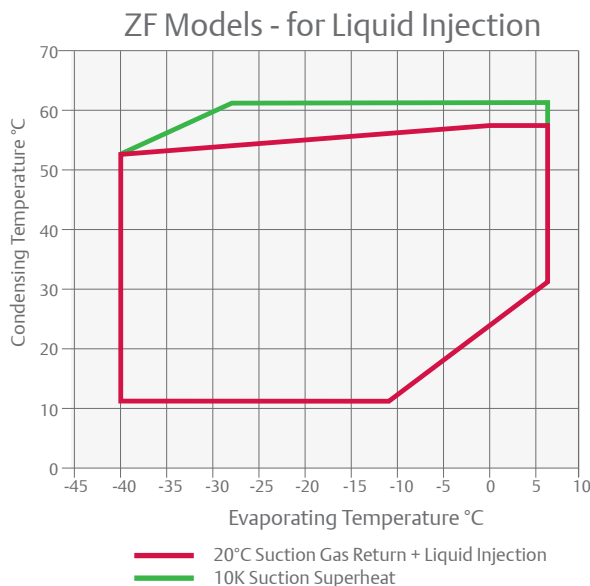
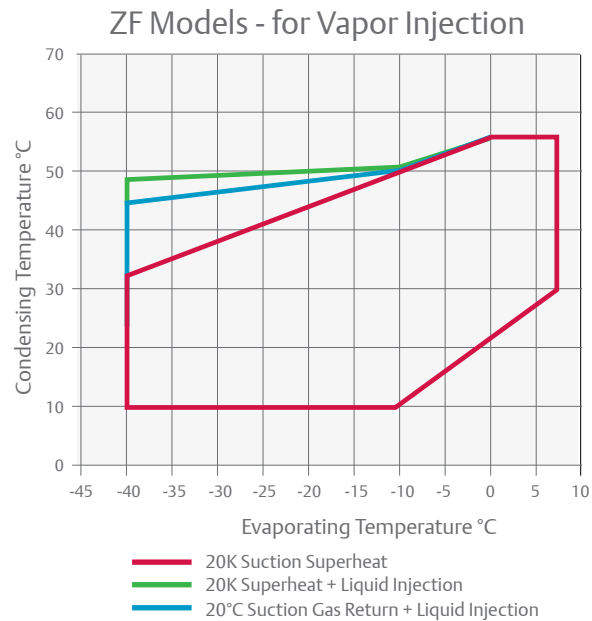
Maximum Allowable Pressure (PS)

- ZF06 to ZF18 (K4E/KVE):
Low Side PS 21 bar(g) / High Side PS 32 bar(g)
- ZF25 to ZF54 (K5E):
Low Side PS 22.6 bar(g) / High Side PS 32 bar(g)
- Digital ZFD:
Low Side PS 22.6 bar(g) / High Side PS 32 bar(g)

Operating Envelope R407A

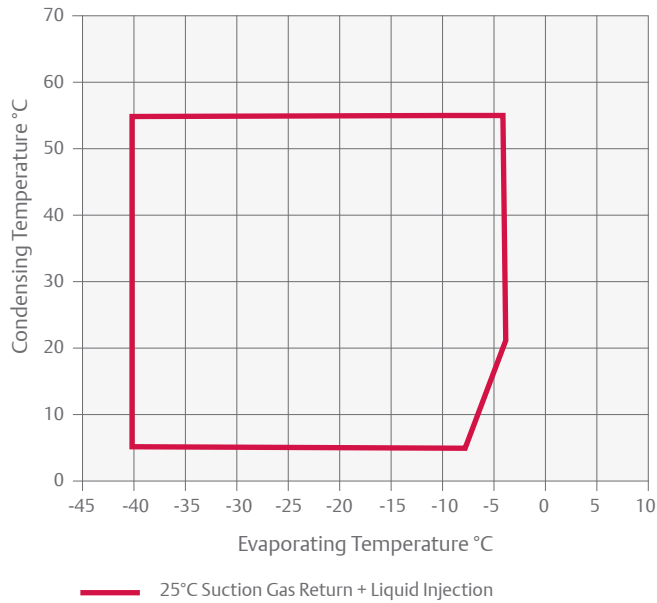


Operating Envelope R407F



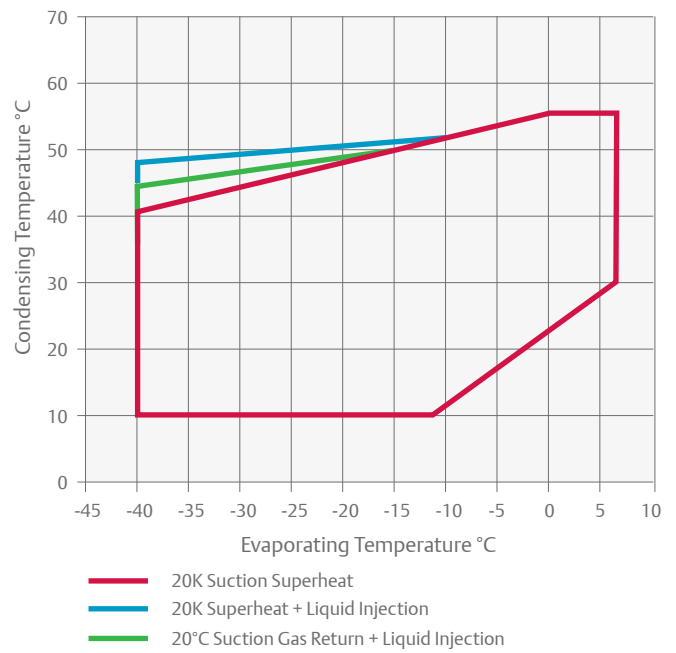
Operating Envelope R448A/R449A

ZF Models - for Liquid Injection



For individual model details please refer to Select Software.

For ZFD Digital Models



Technical Overview

Models	Nominal hp	Displacement (m ³ /h)	Rotolock Suction (inch)	Rotolock Discharge (inch)	Oil Quantity (l)	Length/Width/Height (mm)	Net Weight (kg)	Motor Version/Code	Maximum Operating Current (A)	Locked Rotor Current (A)	Sound Pressure @1 m - db(A)***
								3 Ph**	3 Ph**	3 Ph**	
Models with Liquid Injection only											
ZF06K4E	2.0	5.9	1 1/4	1	1.3	243/245/369	25.4	TFD	5	26	57
ZF08K4E	2.5	7.3	1 1/4	1	1.5	243/245/391	27.2	TFD	6	32	59
ZF09K4E	2.8	8.0	1 1/4	1	1.5	243/244/391	27.0	TFD	6	40	62
ZF11K4E	3.5	9.9	1 1/4	1	1.5	243/244/405	28.0	TFD	7	46	63
ZF13K4E	4.0	11.8	1 1/4	1	1.9	246/251/442	38.0	TFD	8	51	65
ZF15K4E	5.0	14.5	1 1/4	1	1.9	246/251/442	39.0	TFD	10	64	65
ZF18K4E	6.0	17.1	1 1/4	1	1.9	246/251/442	41.0	TFD	12	74	67
Models with Vapor Injection only											
ZF13KVE	4.0	11.7	1 1/4	1	1.9	246/251/442	38.0	TFD	9	64	63
ZF18KVE	6.0	17.1	1 1/4	1	1.9	246/251/442	39.5	TFD	13	74	67
Models which can have Liquid or Vapor Injection											
ZF25K5E	7.5	21.4	1 1/4	1 1/4	1.9	246/257/452	39.5	TFD	16	102	70
ZF34K5E	10.0	29.1	1 3/4	1 1/4	3.4	280/280/534	63.1	TFD	25	100	68
ZF41K5E	13.0	35.3	1 3/4	1 1/4	3.4	280/280/534	63.1	TFD	29	118	69
ZF49K5E	15.0	42.4	1 3/4	1 1/4	3.4	280/280/552	66.2	TFD	30	139	72
ZF54K5E	17.0	48.3	1 3/4	1 1/4	3.4	363/312/552	66.2	TFD	31	168	78
Digital Models											
ZFD13KVE EVI	4.0	11.7	1 1/4	1	1.9	246/250/481	38	TFD	9	64	65
ZFD18KVE EVI	6.0	17.1	1 1/4	1	1.9	300/299/481	43	TFD	13	74	67
ZFD25KVE EVI	7.5	21.4	1 1/4	1 1/4	1.9	246/250/481	43	TFD	16	102	70
ZFD41K5E	10.0	35.3	1 3/4	1 1/4	3.4	310/280/534	66	TFD	20	118	73
ZFD41K5E EVI	13.0	35.3	1 3/4	1 1/4	3.4	310/280/534	66	TFD	20	118	72

** 3 Ph: 380-420V/ 50Hz

*** @ 1m: sound pressure level at 1m distance from the compressor, free field condition

Capacity Data

Condensing Temperature 40°C															
R407A	Cooling Capacity (kW)							R407A	Power Input (kW)						
	Evaporating Temperature (°C)								Evaporating Temperature (°C)						
Model	-35	-30	-25	-20	-15	-10	-5	Model	-35	-30	-25	-20	-15	-10	-5
Models with Liquid Injection Only															
ZF06K4E	1.2	1.5	1.9	2.3	2.8	3.5	4.2	ZF06K4E	1.2	1.2	1.2	1.3	1.4	1.4	1.5
ZF08K4E	1.4	1.9	2.4	3.0	3.6	4.4	5.3	ZF08K4E	1.4	1.4	1.5	1.6	1.6	1.7	1.8
ZF09K4E	1.6	2.0	2.6	3.2	3.9	4.8	5.9	ZF09K4E	1.5	1.5	1.6	1.6	1.7	1.8	1.9
ZF11K4E	2.0	2.6	3.2	4.0	4.9	6.0	7.3	ZF11K4E	1.9	1.9	1.9	2.0	2.0	2.2	2.3
ZF13K4E	2.2	2.9	3.6	4.5	5.6	6.8	8.3	ZF13K4E	2.3	2.3	2.4	2.5	2.5	2.6	2.8
ZF15K4E	2.7	3.5	4.4	5.5	6.8	8.4	10.2	ZF15K4E	2.7	2.8	2.9	3.1	3.2	3.4	3.6
ZF18K4E	3.3	4.3	5.4	6.7	8.3	10.2	12.4	ZF18K4E	3.3	3.4	3.5	3.6	3.8	3.9	4.1
Models with Vapor Injection Only															
ZF13KVE	3.1	3.9	4.9	5.9	7.2	8.7	10.4	ZF13KVE	2.4	2.4	2.5	2.6	2.7	2.7	2.7
ZF18KVE	4.9	6.0	7.3	8.8	10.8	13.3	16.4	ZF18KVE	3.4	3.5	3.6	3.7	3.9	4.1	4.4
Models which can have Liquid or Vapor Injection															
ZF25K5E	4.3	5.5	6.9	8.6	10.7	13.2	16.0	ZF25K5E	4.0	4.2	4.5	4.7	4.9	5.2	5.4
ZF25K5E (EVI)	6.1	7.7	9.4	11.4	13.5	15.8	18.2	ZF25K5E (EVI)	4.3	4.4	4.6	4.8	5.0	5.3	5.5
ZF34K5E	5.9	7.6	9.6	12.1	15.0	18.3	22.3	ZF34K5E	5.1	5.5	5.9	6.2	6.6	6.9	7.3
ZF34K5E (EVI)	8.0	9.9	12.1	14.6	17.4	20.7	24.2	ZF34K5E (EVI)	5.3	5.5	5.7	5.9	6.1	6.3	6.4
ZF41K5E	7.3	9.3	11.7	14.5	17.9	21.8	26.4	ZF41K5E	6.2	6.7	7.1	7.6	8.0	8.4	8.9
ZF41K5E (EVI)	10.1	12.6	15.5	18.7	22.1	25.8	29.7	ZF41K5E (EVI)	6.7	6.9	7.2	7.4	7.6	7.8	8.0
ZF49K5E	8.6	11.2	14.1	17.7	21.9	26.8	32.5	ZF49K5E	7.6	8.2	8.7	9.2	9.7	10.2	10.7
ZF49K5E (EVI)	12.1	15.1	18.4	22.3	26.8			ZF49K5E (EVI)	8.0	8.3	8.5	8.8	9.1		
ZF54K5E	9.5	12.2	15.4	19.3	23.8			ZF54K5E	8.1	8.6	9.3	10.0	10.8		
ZF54K5E (EVI)	14.5	17.8	21.6	26.1	31.4			ZF54K5E (EVI)	9.7	10.1	10.4	10.7	11.1		
Digital Models															
ZFD13KVE EVI	3.1	4.1	5.2	6.4	7.7	9.2	10.9	ZFD13KVE EVI	2.7	2.8	2.8	2.9	2.9	3.0	3.1
ZFD18KVE EVI	4.9	6.0	7.3	8.8	10.8	13.3	16.4	ZFD18KVE EVI	3.4	3.5	3.6	3.7	3.9	4.1	4.4
ZFD25KVE EVI	6.1	7.7	9.4	11.4	13.5	15.8	18.2	ZFD25KVE EVI	4.3	4.4	4.6	4.8	5.0	5.3	5.5
ZFD41K5E	7.3	9.3	11.8	14.6				ZFD41K5E	6.2	6.7	7.2	7.5			
ZFD41K5E EVI	10.1	12.6	15.5	18.7	22.1	25.8	23.7	ZFD41K5E EVI	6.7	6.9	7.2	7.4	7.6	7.8	8.0

Conditions: Suction Gas Return 20°C / Subcooling 0K

Preliminary Data

Capacity Data

Condensing Temperature 40°C															
R407F	Cooling Capacity (kW)							R407F	Power Input (kW)						
	Evaporating Temperature (°C)								Evaporating Temperature (°C)						
Model	-35	-30	-25	-20	-15	-10	-5	Model	-35	-30	-25	-20	-15	-10	-5
Models with Liquid Injection Only															
ZF06K4E	1.2	1.5	1.9	2.3	2.8	3.5	4.2	ZF06K4E	1.3	1.3	1.3	1.4	1.4	1.5	1.6
ZF08K4E	1.4	1.9	2.4	3.0	3.6	4.4	5.3	ZF08K4E	1.5	1.5	1.6	1.6	1.7	1.8	1.9
ZF09K4E	1.6	2.0	2.6	3.2	3.9	4.8	5.9	ZF09K4E	1.6	1.6	1.6	1.7	1.8	1.9	2.0
ZF11K4E	2.0	2.6	3.2	4.0	4.9	6.0	7.3	ZF11K4E	1.9	2.0	2.0	2.1	2.2	2.3	2.4
ZF13K4E	2.2	2.9	3.6	4.5	5.6	6.8	8.3	ZF13K4E	2.4	2.4	2.5	2.6	2.7	2.8	2.9
ZF15K4E	2.7	3.5	4.4	5.5	6.8	8.4	10.2	ZF15K4E	2.8	3.0	3.1	3.2	3.4	3.5	3.8
ZF18K4E	3.3	4.3	5.4	6.7	8.3	10.2	12.4	ZF18K4E	3.5	3.6	3.7	3.8	4.0	4.1	4.3
Models with Vapor Injection Only															
ZF13KVE	3.3	4.3	5.4	6.7	8.1	9.7	11.5	ZF13KVE	2.8	2.9	3.0	3.0	3.1	3.2	3.3
ZF18KVE	4.9	6.1	7.6	9.3	11.3	13.5	16.0	ZF18KVE	3.8	4.0	4.1	4.2	4.4	4.5	4.7
Models which can have Liquid or Vapor Injection															
ZF25K5E	4.5	5.8	7.3	9.1	11.3	13.8	16.8	ZF25K5E	4.2	4.4	4.7	4.9	5.2	5.4	5.7
ZF25K5E (EVI)	6.4	8.0	9.9	11.9	14.2	16.6	19.1	ZF25K5E (EVI)	4.5	4.7	4.9	5.1	5.3	5.5	5.8
ZF34K5E	6.2	8.0	10.1	12.7	15.7	19.3	23.4	ZF34K5E	5.6	5.8	6.0	6.2	6.4	6.6	6.8
ZF34K5E (EVI)	8.3	10.4	12.7	15.4	18.4	21.7	25.4	ZF34K5E (EVI)	5.3	5.5	5.7	5.9	6.1	6.3	6.4
ZF41K5E	7.6	9.7	12.3	15.2	18.8	22.9	27.7	ZF41K5E	6.5	7.0	7.5	8.0	8.4	8.9	9.3
ZF41K5E (EVI)	10.6	13.3	16.3	19.6	23.2	27.1	31.2	ZF41K5E (EVI)	7.0	7.3	7.5	7.7	8.0	8.2	8.4
ZF49K5E	9.1	11.7	14.8	18.6	23.0	28.1	34.2	ZF49K5E	8.0	8.6	9.1	9.6	10.2	10.7	11.2
ZF49K5E (EVI)	14.1	17.1	20.5	24.5	28.9			ZF49K5E (EVI)	9.1	9.7	10.3	10.8	11.3		
ZF54K5E	9.9	12.6	15.8	19.5	23.9			ZF54K5E	8.5	9.1	9.8	10.5	11.3		
ZF54K5E (EVI)	15.2	18.7	22.7	27.4	33.0			ZF54K5E (EVI)	10.2	10.6	10.9	11.3	11.6		
Digital Models															
ZFD13KVE EVI	3.3	4.3	5.4	6.7	8.1	9.7	11.4	ZFD13KVE EVI	2.8	2.9	3.0	3.0	3.1	3.1	3.2
ZFD18KVE EVI	4.9	6.1	7.6	9.3	11.3	13.5	16.0	ZFD18KVE EVI	3.8	4.0	4.1	4.2	4.4	4.5	4.7
ZFD25KVE EVI	6.4	8.0	9.9	11.9	14.2	16.6	19.1	ZFD25KVE EVI	4.5	4.7	4.9	5.1	5.3	5.5	5.8
ZFD41K5E	7.3	9.3	11.8	14.6				ZFD41K5E	6.2	6.7	7.2	7.5			
ZFD41K5E EVI	23.5	29.8	37.2	45.9				ZFD41K5E KVE	6.4	6.6	6.8	7.1			

Conditions: Suction Gas Return 20°C / Subcooling 0K

Preliminary Data

Capacity Data

Condensing Temperature 40°C															
R448A/ R449A	Cooling Capacity (kW)							R448A/ R449A	Power Input (kW)						
	Evaporating Temperature (°C)								Evaporating Temperature (°C)						
Model	-35	-30	-25	-20	-15	-10	-5	Model	-35	-30	-25	-20	-15	-10	-5
Models with Liquid Injection Only															
ZF06K4E	1.2	1.5	1.9	2.4	2.9	3.6	4.3	ZF06K4E	1.3	1.4	1.4	1.4	1.5	1.5	1.6
ZF08K4E	1.4	1.8	2.3	2.9	3.5	4.4	5.3	ZF08K4E	1.4	1.5	1.6	1.6	1.7	1.8	1.9
ZF09K4E	1.7	2.1	2.6	3.3	4.0	4.9	5.9	ZF09K4E	1.5	1.5	1.6	1.7	1.8	1.9	2.0
ZF11K4E	2.1	2.6	3.3	4.0	4.9	6.0	7.2	ZF11K4E	2.0	2.0	2.1	2.2	2.3	2.4	2.6
ZF13K4E	2.4	3.1	3.9	4.8	5.9	7.2	8.6	ZF13K4E	2.1	2.2	2.3	2.4	2.5	2.6	2.8
ZF15K4E	3.0	3.8	4.8	5.9	7.2	8.6	10.3	ZF15K4E	2.8	2.8	3.0	3.1	3.3	3.4	3.6
ZF18K4E	3.6	4.7	5.9	7.2	8.8	10.7	12.9	ZF18K4E	3.6	3.6	3.6	3.6	3.7	3.9	4.0
Models with Vapor Injection Only															
ZF13KVE	3.2	4.1	5.1	6.2	7.5	9.0	10.6	ZF13KVE	2.5	2.6	2.7	2.8	2.8	2.9	2.9
ZF18KVE	4.9	6.0	7.4	9.0	10.9	13.0	15.5	ZF18KVE	3.4	3.7	3.9	4.0	4.1	4.2	4.3
Models which can have Liquid or Vapor Injection															
ZF25K5E	4.9	6.1	7.6	9.4	11.4	13.8	16.6	ZF25K5E	3.8	3.9	4.1	4.3	4.5	4.8	5.0
ZF25K5E (EVI)	6.1	7.7	9.4	11.3	13.4	15.6	17.9	ZF25K5E (EVI)	4.0	4.3	4.6	4.9	5.2	5.4	5.6
ZF34K5E	6.1	7.8	9.8	12.1	14.9	18.1	21.7	ZF34K5E	5.1	5.3	5.4	5.7	6.0	6.3	6.7
ZF34K5E (EVI)	8.1	10.3	12.7	15.5	18.6	22.1	26.0	ZF34K5E (EVI)	5.7	6.1	6.5	7.0	7.5	8.1	8.7
ZF41K5E	7.4	9.4	11.8	14.6	17.8	21.5	25.8	ZF41K5E	5.8	6.1	6.5	7.0	7.7	8.4	9.4
ZF41K5E (EVI)	9.8	12.5	15.5	18.9	22.6	26.9	31.6	ZF41K5E (EVI)	7.0	7.5	8.0	8.6	9.2	9.9	10.7
ZF49K5E	9.1	11.6	14.6	18.1	22.2	27.0	32.5	ZF49K5E	7.7	7.8	8.0	8.4	8.9	9.4	10.0
ZF49K5E (EVI)	11.8	14.8	18.2	22.1	26.6			ZF49K5E (EVI)	8.6	9.1	9.6	10.2	10.9		
ZF54K5E	10.0	12.7	15.9	19.8	24.3			ZF54K5E	8.0	8.6	9.3	10.1	10.9		
ZF54K5E (EVI)	14.1	17.4	21.4	25.9	31.2			ZF54K5E (EVI)	10.5	11.1	11.7	12.4	13.3		
Digital Models															
ZFD13KVE EVI	4.0	4.9	6.0	7.2	8.5	10.0	11.7	ZFD13KVE EVI	2.9	3.0	3.1	3.2	3.3	3.4	3.5
ZFD18KVE EVI	6.1	7.3	8.7	10.4	12.3	14.4	16.9	ZFD18KVE EVI	4.0	4.3	4.5	4.6	4.8	5.0	5.1
ZFD25KVE EVI	7.7	9.3	11.2	13.2	15.3	17.5	19.7	ZFD25KVE EVI	4.8	5.1	5.4	5.7	6.0	6.3	6.6
ZFD41K5E EVI	12.5	15.0	18.1	21.5	25.4	29.5	33.9	ZFD41K5E EVI	7.9	8.4	8.8	9.3	9.7	10.1	10.6
ZFD41K5E	8.6	10.6	13.0	15.7	18.9	22.6	27.0	ZFD41K5E	6.3	6.7	7.1	7.5	7.9	8.4	8.8

Conditions: Suction Gas Return 20°C / Subcooling 0K

Preliminary Data